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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/461,158	12/14/1999	ANNE E. MILLER	042390.P6958	3401

7590

04/02/2002

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EXAMINER

BROWN, CHARLOTTE A

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 04/02/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/461,158

Applicant
Miller et al.

Examiner
Charlotte A. Brown

Art Unit
1765



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jan 17, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 28-33 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 28-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 20) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-14 and 28-33 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mravic et al. (US 6,083,840).

Mravic discloses a chemical-mechanical polishing method for polishing a copper layer. A silicon dioxide layer is formed over a silicon substrate. Trenches are formed within the substrate. A diffusion barrier layer is formed over the structure. Suitable compounds for the diffusion barrier layer include titanium, tantalum nitride, and tantalum silicon nitride. This reads on the applicant's limitation of forming a copper diffusion barrier in the trenches. An overlayer of copper is deposited in the trenches and the vias. This reads on the applicant's limitation of depositing copper over the copper diffusion barrier and over a top surface of the dielectric layer. Chemical-mechanical polishing removes the copper overlayer to produce an integrated circuit portion (Column 4, lines 1-18). A Cu/Ta/SiO₂ slurry composition is used to polish copper. The polishing

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slurry comprises an oxidizer. Any suitable oxidizer may be used. The slurry may further comprise surfactants, chelating agents, and corrosion inhibitors (Column 8, lines 4-10). An inorganic acid is added in sufficient amounts for the slurry to have a pH from about 9 to 11 (Column 8, lines 1-4). This reads on the applicant's limitation of polishing the copper with a high pH slurry. The bulk copper polishing slurry has a silica abrasive with a weight in the range of 1-12%. The preferred range is 3-5% (Column 7, lines 20-33). Therefore, this reads on the applicant's limitation of polishing the copper with a high pH slurry having less than or equal to 10 wt% of abrasive.

Unlike the claimed invention, Mravic does not teach a method in which the copper film is polished with a slurry having a pH in such a range that a protective layer is formed over the film during polishing, but because the copper film is polished with a high pH slurry, it appears that a protective layer would inherently be formed.

3. Claims 6,8,9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mravic et al. (US 6,083,840).

The above cited dependent claims differ from Mravic by specifying various processing conditions. It is the Examiner's position that a person having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify Mravic by using different processing parameters because same were known to be cause effective variables and routine experimentation would have been expected to optimize them.

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Changes in temperature, concentrations, or other process conditions of an old process does not impart patentability unless the recited ranges are critical, i.e., they produce a new and unexpected result. *In re Aller et al.*, 105 USPQ 233.

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. (US 6,001,730 and 6,221,775)

Response to Arguments

5. Applicant's arguments filed January 17, 2002 have been fully considered but they are not persuasive.

In traversing the rejection based on Mravic, the applicant states that Mravic fails to disclose or render obvious polishing a copper film with a high pH slurry which has an abrasive an amount of less than or equal to 10 wt%. This point is not accepted since Mravic discloses a bulk copper polishing slurry that comprises an acid and an oxidizer. The acid is added in sufficient amounts for the slurry to have a pH from about 9 to 11 (Column 8, lines 1-4). Therefore, the bulk copper polishing slurry has a high pH. The bulk copper polishing slurry has a silica abrasive with a weight in the range of 1-12%. The preferred range is 3-5% (Column 7, lines 20-33). Therefore,

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this reads on the applicant's limitation of polishing the copper with a high pH slurry having less than or equal to 10 wt% of abrasive.

The applicants also argue that Mravic does not utilize a high pH slurry since the pH is not in the passivation region of the Pourbiax diagram for copper. It is the Examiner's position that the applicant's statement is mere attorney argument that should be in the form of a declaration.

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

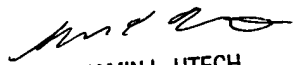
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7. Any inquiry concerning this communication from the Examiner should be directed to Charlotte A. Brown whose telephone number is 703-305-0727. The Examiner can normally be reached during the hours of 9:00AM to 6:30PM.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-5408 for regular communications and 703-872-9311 for After Final communications.

CAB

April 1, 2002


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